

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

QUECTEL WIRELESS SOLUTIONS CO. LTD.,
Petitioner,

v.

KONINKLIJKE PHILIPS N.V.,
Patent Owner.

IPR2021-00562
Patent 10,257,814 B2

Before KEVIN F. TURNER, MICHELLE N. WORMMEESTER, and
RUSSELL E. CASS, *Administrative Patent Judges*.

CASS, *Administrative Patent Judge*.

JUDGMENT
Final Written Decision
Determining All Challenged Claims Unpatentable
35 U.S.C. § 318(a)

I. INTRODUCTION

A. Background

In this *inter partes* review, Quectel Wireless Solutions Co. Ltd. (“Petitioner”) challenges the patentability of claims 1–13 and 27–33 (the “challenged claims”) of U.S. Patent No. 10,257,814 B2 (Ex. 1001, “the ’814 patent”), which is assigned to Koninklijke Philips N.V. (“Patent Owner”).

We have jurisdiction under 35 U.S.C. § 6. This Final Written Decision, issued pursuant to 35 U.S.C. § 318(a), addresses issues and arguments raised during the trial in this *inter partes* review. For the reasons discussed below, Petitioner has proven by a preponderance of the evidence that claims 1–13 and 27–33 are unpatentable.

B. Procedural History

In this proceeding, Petitioner relies upon the following references:

Choi et al., US 2003/0147371 A1, published Aug. 7, 2003 (Ex. 1004, “Choi”);

Gollamudi, U.S. Patent No. 7,801,087 B2, issued Sept. 21, 2010 (Ex. 1005, “Gollamudi”);

Rudolf, US 2005/0105487 A1, published May 19, 2005 (Ex. 1006, “Rudolf”).

Petition (“Pet.”) ii, 1.

Petitioner submits declarations from Dr. Jonathan Wells (Exs. 1003, 1010) and Craig Bishop (Ex. 1009). Patent Owner submits the Declaration of Mark Lanning (Ex. 2001).

Petitioner challenges the patentability of claims 1–13 and 27–33 of the ’814 patent based on the following grounds:

Claim(s) Challenged	35 U.S.C. §	Reference(s)/Basis
1–13, 27–33	103(a) ¹	Choi, Gollamudi
4, 30	103(a)	Choi, Gollamudi, Rudolf

Pet. 1. Patent Owner filed a Preliminary Response. Paper 7 (“Prelim. Resp.”). We initiated trial on all grounds of unpatentability. Paper 8 (“Inst. Dec.”), 24.

During the trial, Patent Owner filed a Response (Paper 13, “PO Resp.”), Petitioner filed a Reply (Paper 17, “Pet. Reply”), and Patent Owner filed a Sur-reply (Paper 24, “PO Sur-reply”).

An oral hearing was held on September 9, 2022, a transcript of which appears in the record. Paper 31 (“Tr.”).

C. Real Parties in Interest

Petitioner states that “Quectel Wireless Solutions Co. Ltd.” is the real party in interest. Pet. 64. Patent Owner states that “Koninklijke Philips N.V. is the sole assignee of” the ’814 patent.” Paper 4, 1.

D. Related Proceedings

The parties identify the following district court case involving the ’814 patent: *Koninklijke Philips N.V. v Quectel Wireless Solutions Co. Ltd.*, No. 1:20-cv-01707-CFC (D. Del.). Pet. 64–65; Paper 4, 1.

¹ The Leahy-Smith America Invents Act, Pub. L. No. 112-29, 125 Stat. 284 (2011) (“AIA”), included revisions to 35 U.S.C. § 103 that became effective after the filing of the application that led to the ’814 patent. Therefore, we apply the pre-AIA version of 35 U.S.C. § 103.

E. The '814 Patent (Ex. 1001)

The '814 patent is directed to “the allocation of available transmission resources” in a Universal Mobile Telecommunications System (UMTS) wireless telecommunication using a High Speed Downlink Packet Access (HSDPA) scheme. Ex. 1001, 1:12–28. The '814 patent states that, in a traditional HSDPA system, “the available transmission resources are codes” which “are listed within a list consisting of 15 available codes.” *Id.* at 1:12–16. “According to the UMTS specifications, it is required that each set of codes is in a single contiguous block, meaning that the code numbers for a single terminal are consecutive.” *Id.* at 1:16–19. Thus, to signal these codes, only two parameters are necessary, a starting point in the list and a number of codes allocated to the particular terminal. *Id.* at 1:19–22. These codes are signaled on one or more High Speed Shared Control Channels (HS-SCCH). *Id.* at 1:29–36. The '814 patent notes that “the amount of signaling overhead for UMTS is potentially significant” and that it would be desirable “to minimize the number of bits used for the signaling.” *Id.* at 1:41–43.

To address this issue, the '814 patent aims to “provide a method for dynamically allocating the available transmission resources, using less signaling overhead.” Ex. 1001, 1:47–49. In one embodiment, “the starting code, i.e. the first available resource of the set of resources allocated, is fixed for each control channel,” with “these starting points being different between each control channel.” *Id.* at 2:55–60. “Then, the second parameter,” which may be the number of codes, “needs to be signaled dynamically on the HS-SCCH itself.” *Id.* at 2:60–64. The '814 patent describes an example where “two HS-SCCHs would be preconfigured with a defined starting code offset and direction for counting the signaled number of codes,” such as to

“preconfigure the first HS-SCCH with a starting code of 1, from which the signaled number of codes is counted upwards, and the second HS-SCCH with a starting code of 15, from which the signaled number of codes is counted downward.” *Id.* at 3:4–11.

The '814 patent also describes several variants for signaling information dynamically. For example, in one variant, “the HS-SCCH may be preconfigured with a set of starting points . . . from which the exact starting point is signaled dynamically.” Ex. 1001, 3:42–46. In another variant, “the signaling may further comprise a dynamic additional offset of the starting point.” *Id.* at 4:14–24. In yet another variant, “the dynamically signaled parameter is the starting point, the number of codes being already configured for each channel.” *Id.* at 6:12–14.

F. Illustrative Claims

Of the challenged claims, claims 1 and 27 are independent. Claim 1 is illustrative and is reproduced below.

1. [1.P] A method of indicating, to a secondary station, a set of at least one transmission resource from among a plurality of transmission resources, said indicated set of at least one transmission resource being described by a plurality of parameters, said method comprising:

[1.1] preconfiguring, at the secondary station, at least one association between a control signalling channel selected from among a plurality of control signalling channels, and a value of at least one fixed parameter describing the indicated set of at least one transmission resource;

[1.2] coding into an address at least one remaining dynamic parameter from the plurality of parameters describing the indicated set of at least one transmission resource; and

[1.3] transmitting the address, to the secondary station, using the selected control signalling channel.

Ex. 1001, 6:40–56 (bracketed paragraph identifiers added).

II. DISCUSSION

A. Claim Construction

A claim “shall be construed using the same claim construction standard that would be used to construe the claim in a civil action under 35 U.S.C. § 282(b).” 37 C.F.R. § 42.100(b) (2020). Neither party proposes a construction of any claim terms. Pet. 5; PO Resp. 12. We determine that it is not necessary to provide an express interpretation of any claim terms for purposes of this Decision. *See Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017); *Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999) (“[O]nly those terms need be construed that are in controversy, and only to the extent necessary to resolve the controversy.”).

B. Principles of Law

A claim is unpatentable under 35 U.S.C. § 103 if “the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains.” *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007). The question of obviousness is resolved on the basis of underlying factual determinations, including (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art; (3) the level of skill in the art; and (4) where in evidence, objective evidence of non-obviousness. *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966). When evaluating a combination of teachings, we must also “determine whether there was an apparent reason to combine the known elements in the

fashion claimed by the patent at issue.” *KSR*, 550 U.S. at 418 (citing *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006)). Whether a combination of prior art elements would have produced a predictable result weighs in the ultimate determination of obviousness. *Id.* at 416–417.

In an *inter partes* review, the petitioner must show with particularity why each challenged claim is unpatentable. *Harmonic Inc. v. Avid Tech., Inc.*, 815 F.3d 1356, 1363 (Fed. Cir. 2016); 37 C.F.R. § 42.104(b) (2020). The burden of persuasion never shifts to Patent Owner. *Dynamic Drinkware, LLC v. Nat’l Graphics, Inc.*, 800 F.3d 1375, 1378 (Fed. Cir. 2015).

We analyze the challenges presented in the Petition in accordance with the above-stated principles.

C. Level of Ordinary Skill in the Art

Petitioner contends that a person of ordinary skill in the art at the time of the alleged invention would have had “at least a Bachelor’s degree in computer science, electrical engineering, computer engineering, or a related field, with 2–3 years of experience in wireless networks.” Pet. 4 (citing Ex. 1003 ¶ 25). Patent Owner states that “[f]or purposes of this proceeding only,” it “does not dispute Petitioner’s identification of the level of ordinary skill in the art.” PO Resp. 12.

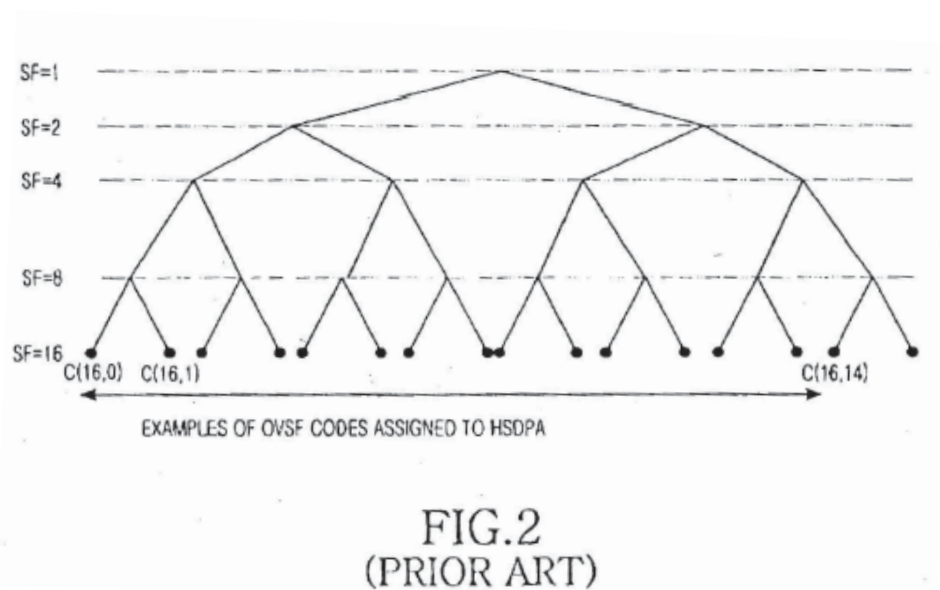
Based on the full trial record, we adopt Petitioner’s assessment of the level of skill in the art, which is consistent with the ’814 patent and the asserted prior art of record.

D. Ground 1(A): Obviousness of Claims 1–13 and 27–33 Based on Choi and Gollamudi

Petitioner contends that claims 1–13 and 27–33 would have been obvious over the combination of Choi and Gollamudi. Pet. 1, 5–55. Patent Owner disagrees, arguing that it would not have been obvious to make the proposed Choi-Gollamudi combination, and that the combination does not teach several of the limitations of these claims. PO Resp. 12–51.

1. Overview of Choi (Ex. 1004)

Choi describes a UMTS mobile communication system that supports an HSDPA scheme and includes HS-SCCH control channels. Ex. 1004 ¶¶ 3–7. The HS-SCCH channels transmit “channelization code information” including orthogonal variable spreading factor (OVSF) codes, a particular number of which can be assigned to one user equipment (UE). *Id.* ¶¶ 7, 25–26. Choi describes an example of assigning codes in a system in which 16 OVSF codes are used. *Id.* ¶¶ 15–18. The OVSF codes are represented according to positions in a code tree, illustrated in Figure 2, reproduced below.



As shown in Figure 2 above, the OVSF codes are represented by $C(i,j)$ according to positions in the code tree, where “i” represents the spreading factor (16) and “j” represents a position starting from the left side of the tree. Ex. 1004 ¶ 17.

Choi explains that, “in the HSDPA communication system, control information exchanged between a UE and a Node B includes the number of OVSF codes to be used by a particular UE, [and] code information designating positions of the OVSF codes in the code tree.” Ex. 1004 ¶ 19. In the example above, Choi explains, seven bits of channelization code information are transmitted on each HS-SCCH, which is separated into a first three bits (for example 110) and a remaining four bits (for example 0011, which equates to “SP(StartPoint)=4”). *Id.* ¶ 37. “That is,” Choi explains, “a logical identifier ‘1100011’ means 7 OVSF codes starting from a 4th OVSF code in an OVSF code tree, i.e., OVSF codes of $C(16, 3)$ to $C(16, 9)$.” *Id.*

2. *Overview of Gollamudi (Ex. 1005)*

Gollamudi describes an HSDPA system using HS-SCCH control channels and an HS-PDSCH data channel. Ex. 1005, 1:46–60. Gollamudi explains that “[t]he HS-SCCH carries several parameters that are required by the user to decode the corresponding HS-PDSCH transmission,” including “parameters that identify the set of codes over which HS-PDSCH signals are transmitted for that user.” *Id.* at 2:4–8. According to Gollamudi, “HS-PDSCH codes are OVSF spreading codes at spreading factor 16, of which there are a total of 16 codes,” a subset of which “are available for use by HS-PDSCH at the base station.” *Id.* at 2:8–11. The HS-SCCH channel “carries information that determines exactly the set of one or more spreading codes from among the available HS-PDSCH codes over which data is transmitted to the scheduled user.” *Id.* at 2:11–15.

Gollamudi describes an improvement by which “an information-bearing message may be inferred by the receiver on the basis of which of the M communication channels was used for transmission.” Ex. 1005, 2:19–22. “In general,” Gollamudi explains, “if there are M parallel communication channels, one of which is chosen for transmission in any instant, then the transmitter can convey $\log_2 M$ bits of information in addition to the information that is carried on the communication channel itself.” *Id.* at 2:30–34. For example, “if each user is configured to monitor $M=4$ HS-SCCH channels, then the base station may convey an additional $\log_2 M=2$ bits of information without increasing the information carried on the HS-SCCH.” *Id.* at 3:5–8.

“Alternatively,” Gollamudi continues, “2 bits of information that are otherwise carried on the HS-SCCH may be conveyed in this manner so that the payload carried by the HS-SCCH is reduced.” Ex. 1005, 3:8–11. Thus,

using this scheme, “transmission of HS-PDSCH code information can be removed from HS-SCCH transmissions, thereby reducing its transmit power requirements.” *Id.* at 4:1–3.

3. *Proposed Combination of Choi and Gollamudi*

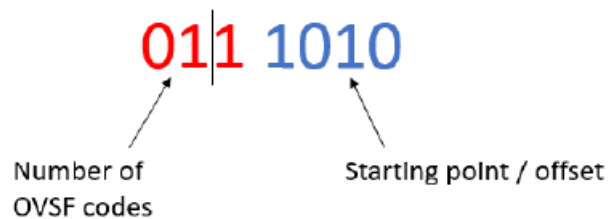
a) *The Parties’ Arguments*

Petitioner argues that Gollamudi “suggests an improvement to an HSDPA UMTS system (such as that described by Choi) that advantageously allows for conveying of additional information based on ‘selection of a particular channel for transmission from among the M available channels.’”

Pet. 11. One of ordinary skill in the art, Petitioner asserts, “would have recognized that such a teaching would have been beneficially applied to Choi to replace $\log_2 M$ bits of information that would normally be conveyed via transmission on a particular HS-SCCH by pre-associating specific values for those bits with available HS-SCCH channels.” *Id.* (citing Ex. 1005, 2:47–56; Ex. 1003 ¶¶ 72–79). According to Petitioner, one of ordinary skill “would have recognized that, in the predictable combination of Choi with Gollamudi, Gollamudi’s technique would have been beneficially employed to replace any portion of the channelization code information conveyed in the HS-SCCH signal described by Choi, including all or a portion of the bits indicating a number of OVSF codes assigned to the UE or all or a portion of the bits indicating a starting point/offset for the OVSF codes assigned to the UE in the code tree.” *Id.* at 12 (citing Ex. 1003 ¶¶ 81–83).

Petitioner provides several example implementations to illustrate the operation of the proposed Choi-Gollamudi combination. Pet. 12–17. Petitioner illustrates these implementations using Choi’s seven bits of

channelization code information with the bits indicating the number of codes in red, and the bits indicating the starting point in blue, as depicted below.

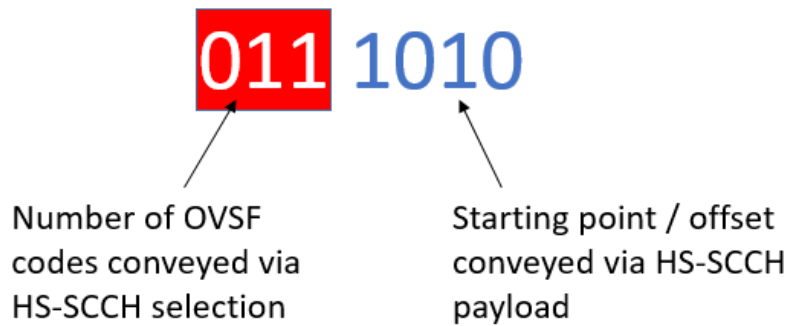


Pet. 12. In the illustration above, the first three bits shown in red (“011”) indicate that the number of codes assigned to the UE is four, and the last four bits shown in blue (“1010”) indicate that the starting point/offset is at the eleventh OVFS code in the code tree.² *Id.* at 12–13.

(1) Petitioner’s First Example Implementation of the Choi-Gollamudi Combination

In Petitioner’s first example implementation, eight HS-SCCHs are employed. Pet. 14–15. Using Gollamudi’s technique, according to Petitioner, allows three bits of the channelization code information to be conveyed by HS-SCCH selection, because $\log_2 8 = 3$. *Id.* In this example, these three bits are used to convey the number of OVFS codes assigned to the UE, as shown by the red box in Petitioner’s illustration, reproduced below.

² According to Petitioner, Choi explains that the number of codes assigned is the value conveyed by the first three bits plus 1, and the starting point is the value conveyed by the last four bits plus one. Pet. 13 n.2, 3 (citing Ex. 1004 ¶ 37; Ex. 1003 ¶¶ 64–65, 83).



Pet. 15 (citing Ex. 1003 ¶ 86). As shown in the illustration above, the first three bits of Choi’s seven bits of channelization code information (“011”), represented in the red box, is conveyed by a preconfigured association between the selected HS-SCCH and a value for those three bits. *Id.* The remaining four bits (shown in blue) represent the starting point/offset and are conveyed dynamically via the HS-SCCH payload. *Id.*

Patent Owner argues that Petitioner’s first example implementation “requires the UE to monitor 8 control channels,” but “[t]he ’814 patent explains that a UE monitors *only up to* 4 control channels,” and “Choi similarly contemplates only 4 control channels,” which “is consistent with the UMTS standard.” PO Resp. 28 (citing Ex. 1001, 1:33–35; Ex. 1004 ¶ 23; Ex. 2001 ¶ 142). According to Patent Owner, one of ordinary skill “would recognize that monitoring more than 4 control channels places an unnecessary burden on the UE balanced against no or very little benefit.” *Id.* at 29 (citing Ex. 2001 ¶ 142).

Petitioner responds that the ’814 patent’s statement that “a UE monitors *only up to* 4 control channels” is only an embodiment, and is not a claim requirement. Pet. Reply 9. Petitioner also asserts that, although Choi states that “in some traditional UMTS systems, each UE monitors ‘a maximum of 4 HS-SCCHs,’ Choi also makes clear that this is ‘[g]enerally’ the case rather than a mandated requirement for all UMTS systems.” *Id.*

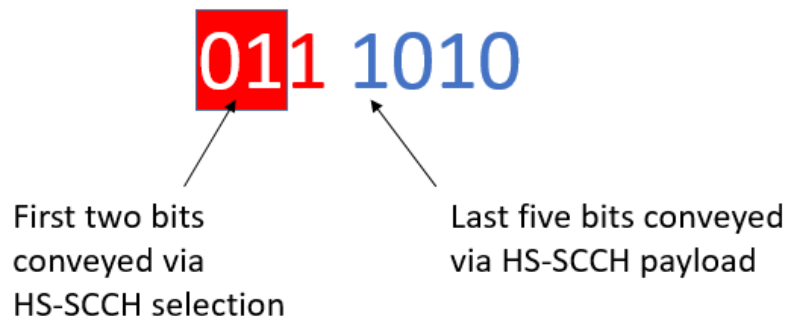
(citing Ex. 1004 ¶ 124; Ex. 1010 ¶ 9) (alteration in original). Petitioner contends that one of ordinary skill would have recognized that “using an even greater number of HS-SCCHs” would provide “power and transmission resource savings” in light of “Gollamudi’s teaching that ‘each user monitors M HS-SCCH channels’ with the specific value of ‘M’ in any implementation being based on design considerations of the specific system.” *Id.* at 9–10 (citing Ex. 1005, 2:57–59; Ex. 1003 ¶¶ 73–81; Ex. 1010 ¶¶ 9–10).

According to Petitioner, this is further supported by Gollamudi’s disclosure that “the more ‘HS-PDSCH code information [that] can be removed from HS-SCCH transmissions’ the greater the reduction in the system’s ‘transmit power requirements.’” *Id.* at 10 (quoting Ex. 1010 ¶ 10 (citing Ex. 1005, 4:1–3)) (alteration in original).

Patent Owner responds that “[d]ue to the well-known limitations on UEs monitoring up to a maximum of four HS-SCCHs in UMTS,” one of ordinary skill “would never have recognized that the supposed tradeoffs and balancing factors should arrive at a solution using more than four HS-SCCHs.” PO Sur-reply 14–15 (citing Ex. 2001 ¶ 142). Patent Owner also argues that Choi’s use of the word “generally” when discussing the use of a maximum of four HS-SCCHs in paragraph 123 is merely saying that UEs “generally monitor the full maximum of four channels, rather than 1–3 channels.” *Id.* at 16 (citing Ex. 2001 ¶¶ 82, 85–86, 142; Ex. 1004 ¶¶ 23, 63). Additionally, Patent Owner contends that “[n]othing in Gollamudi suggests that UEs may monitor more than four channels.” *Id.* (citing Ex. 2001 ¶¶ 85–68, 104, 106, 142).

(2) *Petitioner's Second Example Implementation of the Choi-Gollamudi Combination*

In Petitioner's second example implementation, each UE monitors only four HS-SCCHs rather than eight, allowing $\log_2 4 = 2$ bits to be conveyed by HS-SCCH selection. Pet. 16. In this example, according to Petitioner, two of the first three bits indicating the number of OVSF codes are conveyed via HS-SCCH selection, and the remaining five bits are conveyed dynamically via the payload carried on the HS-SCCH. *Id.* (citing Ex. 1003 ¶ 87). Petitioner includes an annotated figure to illustrate this implementation, which is reproduced below.



Pet. 16 (citing Ex. 1003 ¶ 87). In the illustration above, the first two bits in the red box (“01”) are conveyed by HSSC selection and indicate that at least three OVSF codes are assigned to the UE. *Id.* at 16–17 (citing Ex. 1003 ¶ 87). The additional red “1” to the right of the box is conveyed in the payload and indicates that one additional OVSF code (for a total of four OVSF codes) is assigned to the UE. *Id.* As in the previous example, the last four bits in blue (“1010”) are also conveyed as part of the HS-SCCH payload. *Id.*

Patent Owner acknowledges that the UE in the second example “monitors only 4 control channels,” but argues that “the maximum number of channel codes in a group that could be assigned to a particular UE would

be reduced to 5” down “from the maximum of 15 codes allowed under UMTS, Choi, or the ’814 patent.” PO Resp. 29–30 (citing Ex. 2001 ¶ 153; Ex. 1001, 1:25–27; Ex. 1004 ¶ 7). According to Patent Owner, this “would slow the transfer of data to the single UE” and “slow the transfer of data in subsequent TTIs,” because “two-thirds of the data that could be sent using 15 codes would need to be sent on the subsequent TTIs” resulting in an “artificial reduction of system capacity” by one third. *Id.* at 30.

Patent Owner also argues that the Node B would be “unable to assign the same number of codes to two or more UEs during the same TTI” because a control channel may only specify one allocation to the UE in a given TTI, and thus “if the Node B wants to allocate codes to other UEs during the same TTI, then the Node B must use different HS-SCCH channels.” PO Resp. 31 (citing Ex. 2001 ¶ 155). According to Patent Owner, “after the Node B sends an allocation of 3 or 4 codes on, for example, HS-SCCH number 2, the Node B can no longer use HS-SCCH number 2 again until the next TTI.” *Id.* As a result, Patent Owner contends, “[r]ather than allocating all 15 code channels for the TTI, the Node B in this example would only allocate a total of 11 code channels, wasting 4 code channels.” *Id.* (citing Ex. 2001 ¶ 156). Patent Owner also argues that “Dr. Wells acknowledged the restrictions of the second example during his deposition.” *Id.* (citing Ex. 2002, 140:8–143:9).

In response, Petitioner emphasizes that its Choi-Gollamudi combination merely “change[s] how the code_info bits are conveyed to each UE” using a “combination of fixed and dynamic parameters,” but “does not propose any modifications to how these bits are *interpreted* by the UEs.” Pet. Reply 11. Patent Owner’s “assertion that ‘the maximum number of

channel codes in a group that could be assigned to a particular UE would be reduced to 5” in this example, Petitioner argues, “has no basis in the record.” *Id.* According to Petitioner, this assertion relies on the Lanning Declaration, but Mr. Lanning merely asserts in the cited paragraphs that “only group sizes 2–5 would be available” with “no citations to the record nor any explanation of how this incorrect conclusion was reached.” *Id.* (citing Ex. 2001 ¶¶ 150–151). Additionally, Petitioner contends, Mr. Lanning was unable to identify at his deposition any paper in the record to support this assertion. *Id.* at 11–12 (citing Ex. 1011, 99:25–105:21, 108:11–113:3, 27:22–28:22). According to Petitioner, Mr. Lanning also agreed at his deposition that the second implementation “allows for all possible bit combinations to be conveyed to the UE,” and therefore the proposed combination “allows for all of the same channelization code set sizes as Choi’s unmodified system.” *Id.* at 12 (citing Ex. 1011, 63:9–65:15; Ex. 1010 ¶¶ 11–16). As a result, Petitioner contends, the second example can “assign[] 15 codes to a UE by conveying bit values ‘00’ for the first two code_info bits as a fixed parameter via HS-SCCH channel selection and transmitt[ing] dynamic values of ‘01111’ for the remaining code_info bits.” *Id.* at 13 (citing Ex. 1010 ¶ 16; Ex. 1011, 35:7–16, 36:16–37:3).

As for Patent Owner’s assertion that the second example would not allow a Node B to assign the same number of codes to two different UEs in the same TTI, Petitioner argues that this is a “red herring,” because the challenged claims do not include such a limitation. Pet. Reply 14. Moreover, Petitioner asserts, even if there was some reduced flexibility in this example, one of ordinary skill “would have weighed the power and transmission resource savings achieved by the Choi-Gollamudi combination

against any minor reduction in flexibility in the number of codes that can be assigned to each UE and would have opted for increased power/resource savings in many conventional implementations.” *Id.* (citing Ex. 1010 ¶¶ 17–19). “Furthermore,” Petitioner argues, the Petition’s third example implementation (discussed in detail below) “provid[es] full flexibility regarding the number of codes assigned to each UE while also providing the power/resource savings described in the Petition.” *Id.* at 14–15 (citing Ex. 1010 ¶ 18). Moreover, according to Petitioner, “the ’814 patent itself acknowledges that the claimed method results in a decrease in code allocation flexibility, stating that signaling some code parameter info through a fixed relationship results in ‘80% of the possible combinations of three sets of codes to be signalled’ and that ‘[t]his small limitation may be **acceptable** in view of the associated reduction in signalling overhead.” *Id.* at 16 (citing Ex. 1001, 3:35–41) (alteration in original).

Additionally, Petitioner argues, Patent Owner’s assertion that the second example “would only allocate a total of 11 code channels, wasting 4 code channels” is “plainly false.” Pet. Reply 15 (citing PO Resp. 31; Ex. 1010 ¶¶ 24–26). Petitioner asserts that, even under Patent Owner’s suggested hypothetical, if three codes are assigned to a first UE, “this would be a binary value of ‘010’ (2+1=3),” which “would utilize the HS-SCCH associated with the value ‘01’ for that UE. *Id.* “A second UE could be assigned the HS-SCCH associated with value ‘11’ and assigned a total of 7 PSVF codes (‘110’) while a third UE is assigned the HS-SCCH associated with value ‘10’ and assigned a total of 5 OSVF codes (‘100’).” *Id.* (citing Ex. 1010 ¶¶ 25–26). Under this example, according to Petitioner,

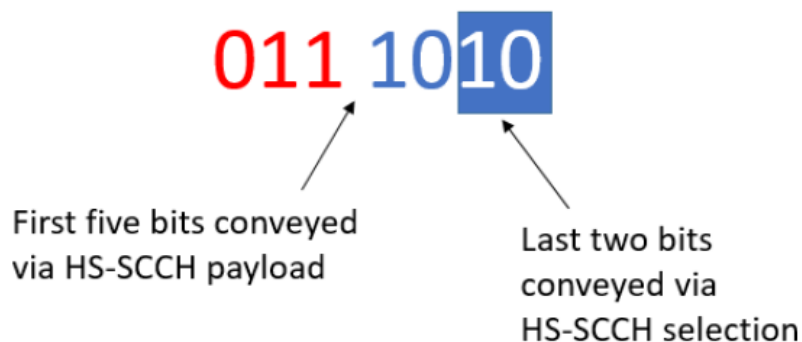
“3+7+5=15, so there are no wasted code channels” and “there is no reduction in the number of codes that can be assigned.” *Id.*

Patent Owner responds to Petitioner’s criticism of Mr. Lanning’s testimony “that the maximum number of channel codes is reduced to 5” by arguing that this opinion “is based upon *Dr. Wells’[s]* own description of the second example,” specifically Dr. Wells’s statement that “two pre-configured bits allocate at least 3 codes and a dynamic bit indicates one additional code (‘for a ***total of four OVSF codes***’).” PO Sur-reply 17 (citing Ex. 2001 ¶¶ 147, 151; Ex. 1003 ¶ 87). Patent Owner also acknowledges that “the claims of the ’814 patent do not require a base station to assign the same number of codes to two different UEs in the same TTI,” but argues that “the inability to perform in this scenario causes significant limitations on the system performance.” *Id.* at 19 (citing Ex. 2001 ¶ 155). Additionally, Patent Owner contends that Petitioner’s example scenario that is capable of allocating all 15 codes to three UEs “is a cherry-picked example” that “does not disprove” the restrictions in Dr. Wells’s example preventing five codes from being allocated to each of the three UEs. *Id.* at 20 (citing Pet. Reply 15). Finally, Patent Owner argues that “the embodiment in the ’814 patent in which over 80% (rather than 100%) of the possible combinations of three sets of codes are enabled” is only “a minor limitation” that “does not rescue the shortcomings in the Choi-Gollamudi combination.” *Id.* at 20–21 (citing Pet. Reply 15–16; Ex. 1001, 3:35–41).

(3) *Petitioner’s Third Example Implementation of the Choi-Gollamudi Combination*

Petitioner also provides a third example implementation, again using four HS-SCCHs, in which the last two bits of Choi’s seven bit channelization code information are conveyed by HS-SCCH selection.

Pet. 17 (citing Ex. 1003 ¶ 88). This implementation is shown by Petitioner’s illustration, reproduced below.



Pet. 17 (citing Ex. 1003 ¶ 88). As shown in the illustration above, “the number of OVSF codes assigned (bits 1–3 in red) are conveyed in the ‘dynamic’ payload of the HS-SCCH.” *Id.* An offset of three (the value of the last two bits in the blue box plus one) is conveyed via HS-SCCH selection, and an additional offset of eight (bits 4–5 in blue to the left of the box) is conveyed via the dynamic payload. *Id.* at 17–18 (citing Ex. 1003 ¶ 88; Ex. 1004 ¶ 37).

Patent Owner argues that, “[a]s with the second example, this third example restricts Node B functionality and capabilities, by limiting the number of starting code offsets that the Node B could use for different UEs during the same TTI,” which “seriously [a]ffects the performance of the HSDPA channel and the overall system performance.” PO Resp. 32 (citing Ex. 2001 ¶¶ 160–166). According to Patent Owner, this third example, like the second example, “could limit the potential offset starting code assigned to the particular UE,” and could also “limit the group size” thereby “further limit[ing] the offsets available to be assigned to other UEs.” *Id.*

Petitioner responds that this example would not have “seriously [a]ffect[ed] the performance of the HSDPA channel and the overall system performance,” as Patent Owner contends. Pet. Reply 17 (second alteration

in original). According to Petitioner, “even the unmodified UMTS system of Choi cannot assign the same starting point to any two UEs because each starting code can only be assigned to one UE.” *Id.* (citing Ex. 1010 ¶ 20; Ex. 1004 ¶¶ 14, 17). Therefore, “the fact that the same starting point cannot be assigned to two UEs in this specific example of the proposed Choi-Gollamudi combination does not pose any additional restrictions.” *Id.* Additionally, Petitioner asserts, this example “allows for the entire code set to be addressed.” *Id.* For example, according to Petitioner, “each value for the last two bits can be assigned to only one UE,” such that “starting points of 0000 (first code), 0011 (fourth code), 1001 (tenth code), and 1110 (fifteenth code)” could be assigned “to respective UEs.” *Id.* (citing Ex. 1010 ¶ 21). “Because the number of codes assigned to each UE is signaled dynamically,” the Node B “can assign three codes, six codes, five codes, and one code to the UEs, respectively[,] for a total of 3+6+5+1=15 codes (the entire code set).” *Id.* at 17–18 (citing Ex. 1010 ¶ 21).

According to Petitioner, “[c]hannelization codes are fungible,” so “the specific starting point assigned to each UE is unimportant, so long as the entire code set can be addressed as is the case with this example.”

Pet. Reply 18 (citing Ex. 1010 ¶ 21; Ex. 2003, 2). Indeed, Petitioner asserts, “[t]his example implementation is actually **less** restrictive than the preferred embodiment of the ’814 patent” because, in that embodiment “**only four possible starting points** are available”—starting points 1, 7, 8, and 15. *Id.* (citing Ex. 1001, 3:50–63; Ex. 1010 ¶ 22). Finally, Petitioner argues that “nothing in the challenged claims mandates that all possible combinations of starting code offsets must be available in all scenarios.” *Id.* (citing Ex. 1010 ¶ 23).

Patent Owner responds that “the third implantation restricts the number of starting code offsets that the base station may allocate to different UEs during the same TTI,” because “[a]fter the base station uses a particular HS-SCCH to allocate the starting code offset for a first UE, ‘it is artificially restricted from using any of the other offsets associated with the same HS-SCCH channel.’” PO Sur-reply 22 (citing Ex. 2001 ¶ 163; PO Resp. 31; Ex. 1011, 116:21–117:14) (emphasis omitted).

(4) Motivation to Combine Choi and Gollamudi

Petitioner argues that multiple reasons would have prompted one of ordinary skill in the art to combine Choi and Gollamudi as described above. Pet. 18. According to Petitioner, this combination would have allowed the payload carried by the HS-SCCH to be reduced, reducing the system’s transmit power requirements. *Id.* This reduction in required transmit power would, in turn, reduce the risk of inter-cell interference and allow additional power to be employed for other purposes such as increasing the range of the base station. *Id.* at 18–19. Petitioner further argues that reducing the number of bits transmitted by the HS-SCCH would reduce the overall overhead required for conveying control information to the UEs, providing more bandwidth for transmitting user data and thereby increasing the data rates and performance of the system. *Id.* at 19 (citing Ex. 1003 ¶ 77). Finally, according to Petitioner, the combination would have been merely the application of a known technique (Gollamudi’s teaching to convey bits of control information via HS-SCCH selection) to a known system (as described by Choi) ready for improvement to yield predictable results. *Id.* at 19–20 (citing Ex. 1003 ¶ 78).

Patent Owner argues that one of ordinary skill would not have been motivated to combine Choi and Gollamudi as Petitioner contends. PO Resp. 26–33. Patent Owner asserts that “Choi and Gollamudi do not address the problems of the ’814 patent in the same manner” because “Choi discloses a ‘100% dynamic transmission resource,’” while “Gollamudi discloses a ‘100% fixed transmission resource,’” and neither discloses a transmission resource with “both a fixed parameter and a dynamic parameter.” *Id.* at 26 (citing Ex. 2001 ¶ 127). In particular, Patent Owner contends, “Gollamudi’s teachings would restrict the capacity of HS-PDSCH” and one of ordinary skill “would not be motivated to combine Choi and Gollamudi to avoid unnecessary restrictions imposed on [a] Node[]B for channel assignment to other UEs during the same TTI.” *Id.* at 27 (citing Ex. 2001 ¶ 129).

In response, Petitioner argues that Patent Owner mischaracterizes the full scope of Gollamudi’s teachings and ignores Gollamudi’s disclosure that “[t]he transmitter can *transmit an additional $\log_2 M$ bits of information* to the scheduled user *by choosing the HS-SCCH channel.*” Pet. Reply 2 (citing Ex. 1005, 2:57–63). Thus, according to Petitioner, Gollamudi suggests “a dynamic ‘payload’ communicated over the selected HS-SCCH channel—in addition to the fixed mapping between each HS-SCCH control channel and a particular value for $\log_2 M$ bits of information.” *Id.* (citing Ex. 1010 ¶¶ 3–8). Petitioner also argues that Patent Owner’s focus on Petitioner’s three examples of how the Choi-Gollamudi combination would have worked in practice ignores Gollamudi’s broader suggestion that its technique would have been useful to replace any portion of the channelization code information conveyed in the HS-SCCH signal described

by Choi, including all or part of the bits indicating the number of OVSF codes assigned to the UE or the starting point/offset for the codes. *Id.* at 7 (citing Pet. 12; Ex. 1003 ¶¶ 79–81).

b) Analysis

Based on the full trial record, Petitioner has proven a sufficient motivation to combine Choi and Gollamudi as proposed. To begin with, we find that Gollamudi proposes a modification to traditional UMTS-HSDPA systems that can be used to reduce the amount of information required to be transmitted on an HS-SCCH by pre-associating a value of some of the information to be transmitted with each monitored HS-SCCH and conveying that pre-associated information with HS-SCCH channel selection. Ex. 1005, 2:19–3:11; Ex. 1003 ¶ 72. We also agree with and find credible Dr. Wells’s testimony that one of ordinary skill would have been motivated to apply Gollamudi’s proposed modification to Choi because Gollamudi states that its modification would have allowed “the payload carried by the HS-SCCH [to be] reduced” and, therefore, “HS-PDSCH code information can be removed from HS-SCCH transmissions, thereby reducing its transmit power requirements.” Ex. 1003 ¶ 73; Ex. 1005, 3:8–11, 4:1–3.

As Dr. Wells explains, reducing these power requirements would have provided savings in electricity, which would have been significant when multiplied over millions of control transmissions, resulting in reduced cost in operating the system. Ex. 1003 ¶ 74. Reducing power requirements would also have reduced inter-cell interference by allowing each Node B base station to reduce the transmit power for each signal, and would have allowed the system to use additional power for other purposes, such as increasing the transmission range of each Node B base station. *Id.* ¶¶ 75–76. We also rely

on and find credible Dr. Wells's testimony that reducing the number of bits required to be transmitted by the HS-SCCH when conveying channelization code information would have reduced the overall overhead required for conveying control information to the UEs, which would have allowed the unused bandwidth to be utilized for transmitting user data. *Id.* ¶ 77.

We disagree with Patent Owner's argument that one of ordinary skill would not have been motivated to combine Choi and Gollamudi because Choi discloses a "100% dynamic transmission resource" and Gollamudi discloses a "100% fixed transmission resource." PO Resp. 26; Ex. 2001 ¶ 127. To the contrary, we agree with Petitioner that this argument ignores Gollamudi's disclosure that "[t]he transmitter can transmit an **additional** $\log_2 M$ bits of information to the scheduled user by choosing the HS-SCCH channel from among the M possibilities," which allows "the payload carried by the HS-SCCH [to be] **reduced**." Ex. 1005, 2:57–63 (emphasis added), 3:5–11 (emphasis added). Similarly, Gollamudi discloses that "[t]he idea of the invention is to be able to transmit extra information of up to $\log_2 M$ bits to the receive in addition to the information that is already carried by the communication channel" by using "selection of a particular channel for transmission from among the M available channels" which "conveys $\log_2 M$ bits of information." *Id.* at 2:50–56. As discussed further below in Section II.D.4(b), we agree with Dr. Wells that these disclosures would have indicated to one of ordinary skill that Gollamudi contemplated implementations in which both a fixed parameter (the $\log_2 M$ bits conveyed via channel selection) and a dynamic parameter (the payload carried by the HS-SCCH) were used to convey control information to the receiver/UE. *See* § II.D.4(b), *infra*; Ex. 1010 ¶¶ 3–6.

We also are not persuaded by Patent Owner’s argument that one of ordinary skill “would not be motivated to combine Choi and Gollamudi to avoid unnecessary restrictions imposed on [the] Node[]B for channel assignment to other UEs during the same TTI.” PO Resp. 27 (citing Ex. 2001 ¶ 129). Mr. Lanning asserts that these “restrictions” arise from Gollamudi’s discussion in Column 3, lines 27–34 of a “100% fixed” mapping in which “the number of codes that may be used is limited to the number of HS-SCCH channels.” Ex. 2001 ¶¶ 110–114, 129. However, as Petitioner and Dr. Wells explain, this portion of Gollamudi describes a particular embodiment that Petitioner does not rely on, which “may eliminate transmission of HS-PDSCH code information from the HS-SCCH by defining a fixed relation between an HS-SCCH channel and a corresponding HS-PDSCH code number.” Ex. 1005, 3:15–21; Pet. Reply 3–4; Ex. 1010 ¶ 8. As Gollamudi explains, this example is limited to “a system where a restriction is imposed on a user to not use more than one HS-PDSCH code per TTI,” which “may be imposed when it is known a priori that the user’s data rate is small enough to be carried using only one HS-PDSCH code per TTI” Ex. 1005, 3:12–18; Pet. Reply 3–4; Ex. 1010 ¶ 8. We agree with Petitioner and Dr. Wells that this specific embodiment does not detract from Gollamudi’s general teaching that the system may use a fixed parameter based on the HS-SCCH selected and dynamic information in the payload, without the restriction that only one HS-PDSH code can be used per TTI. Ex. 1005, 2:50–3:11; Pet. Reply 2–4; Ex. 1010 ¶¶ 2–8.

We now turn to the three example implementations of the Choi-Gollamudi combination presented in the Petition. As to the first example, we find that Petitioner has sufficiently demonstrated that one of ordinary

skill would not have understood the context of Choi and Gollamudi to be limited to systems that monitor a maximum of four HS-SCCHs, but would have been motivated in certain circumstances to use additional HS-SCCHs, such as eight as in Petitioner's example. First, we note that Choi explains that “[g]enerally, in a high speed downlink packet access (HSDPA) communication system, a maximum of 4 HS-SCCHs” are monitored by each UE, suggesting that this is not a rigid limitation. Ex. 1004 ¶ 123 (emphasis added); *see id.* ¶ 23 (using the phrase “[f]or example” when describing “the case where 4HS-SCCHs are set up to the Node B”). We also find credible Dr. Wells's testimony that one of ordinary skill “would have recognized that this is how most UMTS systems were implemented at the time” but also that this was “not a hard and fast rule for all UMTS systems.” Ex. 1010 ¶ 9.

Additionally, we find that Gollamudi contemplates varying the number of HS-SCCH channels monitored by each UE. For example, Gollamudi states that “[t]he set of M channels that a receiver monitors . . . may be different for different receivers,” without limiting M to a maximum of four. Ex. 1005, 1:27–29. Figure 1 of Gollamudi, which illustrates a communication system which may employ Gollamudi's invention, also depicts “Channel #1” through “Channel #M,” which also teaches that the number of channels may be varied and is not limited to a particular number. *Id.* at Fig. 1, 1:13–19, 2:38–40. We also find credible Dr. Wells's testimony that using eight HS-SCCH control channels would have allowed for a greater reduction in information transmitted in the payload, leading to a greater reduction in the systems transmit power requirements, and additional power savings. Ex. 1010 ¶ 10.

We are not persuaded by Mr. Lanning's testimony that "[m]onitoring more than 4 control channels puts an unnecessary burden on the UE with no or very little benefit," because this testimony disregards the advantage of being able to convey additional information using channel selection with eight control channels, and the corresponding power savings. Ex. 2001 ¶ 142. We also do not find that Choi's "example" of using four control channels would discourage one of ordinary skill from considering the use of additional control channels in situations where there would be a benefit from doing so. Ex. 1004 ¶¶ 23, 124.

Turning to Petitioner's second example implementation of the Choi-Gollamudi combination, we also find sufficient evidence that one of ordinary skill would have been motivated to make this implementation. To begin with, we are not persuaded by Patent Owner's argument that one of ordinary skill would have been discouraged from using this implementation because "the maximum number of channel codes in a group that could be assigned to a particular UE would be reduced to 5" down from the maximum of 15 codes allowed under UMTS. PO Resp. 30; Ex. 2001 ¶ 153. For this assertion, Patent Owner relies on Mr. Lanning. *Id.* (citing Ex. 2001 ¶ 153). Mr. Lanning, however, does not base this opinion on his own analysis, but instead purports to rely on Dr. Wells for this assertion. Ex. 2001 ¶ 151 ("Based on Dr. Wells'[s] description of his second example . . . only group sizes 2 –5 would be available."); PO Sur-reply 17 (relating Mr. Lanning's testimony "that the maximum number of channel codes is reduced to 5 is based upon Dr. Wells'[s] own description of the second example."). The portions of Dr. Wells's declaration that Mr. Lanning purports to rely on, however, merely provide one specific example of the second implementation

in which four channel codes are assigned to a UE because the first three bits are 011. Ex. 1003 ¶ 87. Dr. Wells never states that other values could not be used for the first three bits, or that four is the maximum number of codes that could be assigned to a UE in the second implementation. *Id.*

Specifically, the portion of Dr. Wells's declaration that Mr. Lanning relies on states as follows:

In this specific example, the pre-configured value associated with the selected HS-SCCH channel indicates that at least three OVSF codes are assigned to the UE while the dynamically transmitted information (which includes bit 3) indicates that one additional OVSF code (*for a total of four OVSF codes*) is assigned to the UE.

Ex. 1003 ¶ 87 (emphasis added); Ex. 2001 ¶ 147 (quoting Ex. 1003 ¶ 87).

The "specific example" Dr. Wells refers to is the example where the first two bits "01" are conveyed via channel selection and the last five bits "11010" are conveyed via the HS-SCCH payload. Ex. 1003 ¶ 87. Thus, the "total of four OVSF codes" is only for this example where the first three bits are 011, and is not the maximum number of codes that can be assigned to a UE under any combination of bits transmitted using the second implementation. *Id.* ¶ 87; Ex. 1010 ¶ 11.

Additionally, as Dr. Wells explains, Choi discloses that a maximum of 15 OVSF codes can be assigned to one UE using the "code_info" transmitted over an HS-SCCH, and Petitioner's combination does not change "how the UE *interprets* the code_info bits" in Choi, but rather only modifies "how the code_info information described by Choi is *conveyed* from the Node B to the UE." Ex. 1010 ¶ 11; *see* Ex. 1003 ¶¶ 72, 79. Thus, as Dr. Wells testifies, the Choi-Gollamudi combination "allow[s] for all possible bit combinations to be conveyed to the UE," including examples

“that can assign up to 15 OVSF codes to a given UE.” Ex. 1010 ¶¶ 14–15. Mr. Lanning also agreed at his deposition that, in Petitioner’s second example implementation, “all possible values for all seven code bits could be conveyed” to the UE. Ex. 1011, 63:9–65:8.³ Therefore the evidence shows that this implementation allows for all of the same channelization code set sizes as Choi’s unmodified system, including assigning more than five codes to a particular UE.

We also do not agree with Patent Owner’s assertion that the second implementation “would only allocate a total of 11 code channels, wasting 4 code channels.” PO Resp. 31. To begin with, this assertion appears to be based on Patent Owner’s assumption that a maximum of five OVSF codes can be assigned to any particular UE which, as discussed above, we find to be incorrect. *See* Ex. 2001 ¶ 156. Moreover, as Dr. Wells explains, even under Patent Owner’s suggested hypothetical where three codes are assigned to a first UE (represented by a binary value of “100” ($4+1=5$)), a second UE could be assigned seven OSVF codes (“110”), and a third UE can be assigned three OSVF codes (“010”), for a total of 15 OSVF codes ($5+7+3=15$). Ex. 1010 ¶ 26. Thus, under this example, there would be no wasted code channels. *Id.*

Additionally, even if we agree with Patent Owner that “the Node B would [be] unable to assign the same number of codes to two or more UEs during the same TTI” (PO Resp. 31 (citing Ex. 2001 ¶ 155)), we do not agree that this would discourage one of ordinary skill from making the

³ The references to Mr. Lanning’s deposition are to the page numbers of the official transcript made by the court reporter, not to the additional pagination added by Petitioner to Exhibit 1011.

combination in circumstances where power and transmission resource savings were important. In this regard, we rely on and find credible Dr. Wells's testimony that, even if there was some reduced flexibility in this example, "the power savings and other benefits achieved through modification of Choi based on Gollamudi would have ordinarily outweighed any reduction in the flexibility in the different combinations of the number of OVSF codes that can be assigned to a set of UEs." Ex. 1010 ¶ 17. We also find credible Dr. Wells's testimony that one of ordinary skill "would have ordinarily applied prudent allocation of starting points in the OVSF code tree to UEs with a set and allocation of OVSF transmission code resources over adjacent TTIs," which "would have made up for any such loss in flexibility." *Id.*

Our conclusion that one of ordinary skill would have been motivated to accept some limitation in flexibility in assigning OVSF codes to achieve a reduction in signalling overhead (and resulting power savings) is further supported by the '814 patent itself. The claims of the '814 patent do not require that the system be able to assign the same number of codes to more than one UE during a TTI, and the '814 specification recognizes that the invention may limit the number of possible variations of codes that can be signaled to 80% of the total, which "may be acceptable in view of the associated reduction in signalling overhead" due to the use of a fixed parameter. Ex. 1001, 3:35–41.

Finally, we also find that one of ordinary skill would have been motivated to make Petitioner's third example implementation of the Choi-Gollamudi implementation. We are not persuaded by Patent Owner's argument that one of ordinary skill would not have been motivated to use

this implementation because it “restricts Node B functionality and capabilities, by limiting the number of starting code offsets that the Node B could use for different UEs during the same TTI.” *See* PO Resp. 32. To the contrary, we find credible Dr. Wells’s testimony that, “even in Choi’s unmodified UMTS system, the same starting point can never be assigned to the same TTI because each starting code can only be assigned to a single UE,” so the combination of Choi with Gollamudi “does not pose any additional restrictions over the unmodified Choi system.” Ex. 1010 ¶ 20.

We also agree with and find credible Dr. Wells’s testimony that the third Choi-Gollamudi implementation “allows for the entire code set to be addressed.” Ex. 1010 ¶ 21. For example, as Dr. Wells explains, “the Node B could assign starting points of 0000 (first code), 0011 (fourth code), 1001 (tenth code), and 1110 (fifteenth code) to respective UEs” and, “[b]ecause the number of codes assigned to each UE is signaled dynamically,” the Node B “can assign three codes, six codes, five codes, and one code to each of the respective UEs, for a total of $3+6+5+1=15$ codes,” which is “the entire code set.” *Id.* As Dr. Wells further explains, “OVSF channelization codes are fully interchangeable” and “therefore the specific starting point assigned to each UE is unimportant, so long as the entire code set can be addressed.” *Id.* Moreover, we find credible Dr. Wells’s opinion that “[t]he minor reduction in the specific combinations of starting points that can be assigned to a set of UEs is more than made up for by the power savings and other benefits” achieved by this implementation. *Id.* (citing Ex. 1003 ¶¶ 72–78).

Furthermore, as discussed below in Section II.F, Patent Owner’s evidence of objective indicia of obviousness is weak at best. We have fully considered this evidence in our obviousness analysis, and find that it does

not outweigh Petitioner's evidence of motivation to combine Choi and Gollamudi.

For the foregoing reasons, we find that Petitioner has proven by a preponderance of the evidence that one of ordinary skill would have been motivated to combine Choi and Gollamudi as proposed.

4. *Analysis of Independent Claim 1*

- a) [1.P]: “[a] method of indicating, to a secondary station, a set of at least one transmission resource from among a plurality of transmission resources, said indicated set of at least one transmission resource being described by a plurality of parameters, said method comprising”

Petitioner argues that, to the extent the preamble of claim 1 is limiting, the proposed Choi-Gollamudi combination teaches the subject matter of the preamble. Pet. 21–24. The combination, Petitioner asserts, provides a method of indicating, to a secondary station (the UE), a set of at least one transmission resource (OVSF code) from among a plurality of transmission resources (multiple OVSF codes). *Id.* at 21 (citing Ex. 1003 ¶¶ 90–96).

Petitioner argues that the combination discloses “said indicated set of at least one transmission resource being described by a plurality of parameters,” because the transmission resources (OVSF codes) are described by multiple parameters, specifically, a number of codes and a starting point/offset for the assigned codes within the code tree. *Id.* at 23 (citing Ex. 1003 ¶¶ 94–95).

Patent Owner does not present arguments regarding the preamble. PO Resp. 33–45.

We agree with Petitioner that the Choi-Gollamudi combination teaches indicating, to a secondary station (a UE), a set of at least one transmission resource (OSVF code) from among a plurality of transmission resources (multiple OSVF codes). We also agree that the indicated set of at

least one transmission resource (the multiple OVSF codes) are described by parameters, including a number of codes and a starting point/offset for the assigned codes within the code tree.⁴

b) [1.1]: “preconfiguring, at the secondary station, at least one association between a control signalling channel selected from among a plurality of control signalling channels, and a value of at least one fixed parameter describing the indicated set of at least one transmission resource;”

[1.2]: “coding into an address at least one remaining dynamic parameter from the plurality of parameters describing the indicated set of at least one transmission resource; and”

Petitioner argues that the proposed Choi-Gollamudi combination teaches these claim elements. Pet. 24 (citing Ex. 1003 ¶¶ 97–109), 30 (citing Ex. 1003 ¶¶ 110–117).

With respect to limitation 1.1, Petitioner contends that “Gollamudi describes that each HS-SCCH control channel is preconfigured to be associated with a specific value for a set of one or more bits.” Pet. 25 (citing Ex. 1005, 2:50–63; Ex. 1003 ¶¶ 97–98, 69–72, 79–80). According to Petitioner, “this preconfigured association between selection of an HS-SCCH and a bit value for one or more bits” would have been “used to convey a value of at least one fixed parameter describing the indicated set of at least one transmission resource (the parameters being number of codes and starting point/offset for a set of assigned OVSF codes.” *Id.* (citing Ex. 1003 ¶¶ 97, 99, 94–95).

⁴ Because we are persuaded that Petitioner has shown that the Choi-Gollamudi combination teaches the subject matter recited in the preamble, we need not decide whether the preamble is limiting for purposes of this Decision.

Petitioner argues that in its first example implementation (discussed in Section II.D.3 above), the first three bits of channelization code information representing the number of OVSF codes would have been conveyed via HS-SCCH selection, and therefore the number of OVSF codes is a “fixed parameter” pre-associated with the selected HS-SCCH. Pet. 26–27 (citing Ex. 1003 ¶¶ 102–103, 86); *see* § II.D.3, *supra*. Petitioner argues that in its second example implementation, the first two bits conveyed via HS-SCCH selection (representing a portion of the number of OVSF codes assigned) is the “fixed parameter.” Pet. 27–28 (citing Ex. 1003 ¶¶ 104–105, 87, 84–85). For its third example implementation, Petitioner argues that the last two bits conveyed via HS-SCCH selection (representing a portion of the offset) is the “fixed parameter.” *Id.* at 28–29 (citing Ex. 1003 ¶¶ 106–107, 88; Ex. 1004 ¶ 37).

Petitioner further argues that Gollamudi discloses that the UE is able to identify a value for the $\log_2 M$ bits based on which HS-SCCH is selected from among a set of monitored HS-SCCHs, and that one of ordinary skill in the art would have recognized from this disclosure that the UE (secondary station) is preconfigured to identify the association between each HS-SCCH and a respective value for the $\log_2 M$ bits. Pet. 29–30 (citing Ex. 1003 ¶ 108 (citing Ex. 1005, 3:18–21)). Alternatively, Petitioner contends, “it would have been obvious to preconfigure the above described association at each UE to achieve the known benefit of allowing each UE to be capable of determining the intended fixed value for the $\log_2 M$ associated with each monitored HS-SCCH.” *Id.* at 30 (citing Ex. 1003 ¶ 109). According to Petitioner, one of ordinary skill “would have recognized that such a configuration would have beneficially eliminated the need for the value to be

conveyed as bits transmitted on the HS-SCCH to achieve the benefits” previously discussed. *Id.* (citing Ex. 1003 ¶¶ 109, 72–78); *See* § II.D.3, *supra*.

With respect to limitation 1.2, Petitioner argues that, in addition to the bits of channelized code information conveyed via a fixed relationship between each HS-SCCH and a specific value, “the remaining bits” of channelized code information “would have been transmitted dynamically on the selected HS-SCCH.” Pet. 30 (citing Ex. 1003 ¶¶ 101, 110–111, 83, 81); *see* § II.D.4(b), *supra*. Petitioner illustrates this operation by again referring to the three implementations of the Choi-Gollamudi combination discussed in Section II.D.3 above. Pet. 30–32; *see* § II.D.3, *supra*.

Petitioner argues that, in the first implementation where each UE monitors eight HS-SCCHs, and the first three bits of channelization code information (representing the number of OVSF codes) is conveyed via HS-SCCH selection, the final four bits conveyed in the payload (indicating the starting point/offset) represent “a remaining dynamic parameter describing the indicated set of at least one transmission resource.” Pet. 30–31 (citing Ex. 1003 ¶¶ 111–112, 102, 86). In the second implementation where each UE monitors four HS-SCCHs and the first two bits are conveyed via HS-SCCH selection, Petitioner contends that the remaining five bits are “dynamic parameters” that “include an additional number of assigned codes and the starting point/offset within the code tree for the first assigned code.” *Id.* at 28 (citing Ex. 1003 ¶ 105). In the third implementation where each UE monitors four HS-SCCHs, and the last two bits are conveyed via HS-SCCH selection as a fixed parameter, Petitioner contends that the remaining first five bits “are conveyed dynamically via the information actually

transmitted on the selected HS-SCCH.” *Id.* at 31–32 (citing Ex. 1003 ¶ 114; Ex. 1004 ¶ 37).

Petitioner further argues that the Choi-Gollamudi combination teaches that the described remaining dynamic parameter(s) would have been coded into an address, as that term is used in the ’814 patent. Pet. 32 (citing Ex. 1003 ¶¶ 115–117).

Similar to its argument with respect to motivation to combine (PO Resp. 26), Patent Owner argues that “the proposed combination does not suggest a ‘set of at least one transmission resource’ being described by *both* a ‘fixed parameter’ *and* ‘dynamic parameter.’” *Id.* at 34. Patent Owner acknowledges that “Gollamudi configures fixed mappings between an HS-SCCH channel and a HS-PDSCH code (resource codes).” *Id.* at 37 (citing Ex. 1005, 3:35–4:3; Ex. 2001 ¶ 181). Patent Owner asserts, however, that “Gollamudi does not disclose the fixed parameter as called for by the claims, where the fixed parameter represents only part of the information,” but rather “discloses *only* the one-to-one fixed mappings between its resources (HS-DSPCH codes) and its control channels (HS-SCCHs).” *Id.* at 34 (citing Ex. 2001 ¶¶ 108, 109, 174, 181). According to Patent Owner, “[n]othing in Gollamudi suggest[s] its HS-DPSCH codes or HS-SCCHs are referenced in any way other than the one-to-one fixed mappings,” and “nothing in Gollamudi suggests that its HS-SCCHs could be reference[d] using both the fixed mapping to the HS-DPSCH codes and some dynamic parameter.” *Id.* at 34–35 (citing Ex. 2001 ¶¶ 181, 183–187).

Patent Owner acknowledges that “Gollamudi’s mappings remove the need for $\log_2 M$ bits of signaling data conventionally employed for channel selection,” but argues that “[n]othing in Gollamudi suggests anything similar

to the dynamic parameters beyond simply removing the channel selection bits.” PO Resp. 37 (citing Ex. 1005, 3:15–26; Ex. 2001 ¶ 181), 38 (citing Ex. 2001 ¶ 183). Indeed, Patent Owner contends, “Gollamudi is silent as to a ‘dynamic parameter of a plurality of parameters’ describing a transmission resource,” and such a dynamic parameter “is contrary to the teachings of Gollamudi.” *Id.* at 39 (citing Ex. 2001 ¶ 185). Additionally, according to Patent Owner, “[a]lthough Gollamudi mentions in passing that additional information could be conveyed in spare signaling bits, it fails to specify how that information is used” and “never suggests using that information to specify a code.” *Id.* at 43 (citing Ex. 2001 ¶ 200); *see* PO Sur-reply 3–11.

Petitioner responds that Patent Owner “myopically focuses on one specific use case in Gollamudi’s FIG. 2 and column 3:12–43,” in arguing that Gollamudi only discloses fixed mappings, “but never addresses the other pertinent teachings of Gollamudi cited in the Petition.” Pet. Reply 1; Ex. 1010 ¶¶ 2–8. Petitioner argues that “Gollamudi describes that *any number* of ‘M parallel communication channels’ can be used to ‘convey $\log_2 M$ bits of information’ via selection of which control channel is used to convey control information,” and “[t]he transmitter can *transmit an additional $\log_2 M$ bits of information* to the scheduled user by *choosing the HS-SCCH channel*,” which “allows for ‘the payload carried by the HS-SCCH [to be] reduced.’” *Id.* at 2 (citing Pet. 10; Ex. 1005, 2:30–34, 2:47–63, 3:5–11). Thus, according to Petitioner, “the portions of Gollamudi actually relied on by the Petition amply demonstrate Gollamudi’s suggestion for a dynamic ‘payload’ communicated over the selected HS-SCCH control channel—in addition to the fixed mapping between each HS-SCCH control channel and a particular value for $\log_2 M$ bits of information.” *Id.* (citing

Ex. 1010 ¶¶ 3–8). Petitioner also argues that Mr. Lanning “admitted as such repeatedly during his deposition.” *Id.* (citing Ex. 1011, 68:1–120, 71:23–72:15, 75:5–76:20, 77:12–16, 78:1–16, 79:1–15, 81:3–6, 83:5–20, 82:2–9, 89:6–25).

Petitioner also points to “Gollamudi’s description in the summary section that ‘the transmitter can convey $\log_2 M$ bits of information’ via channel selection ‘*in addition to the information that is carried on the communication channel itself.*’” Pet. Reply 2–3 (citing Ex. 1005, 2:24–34). Petitioner further references Gollamudi’s example in which the number of HS-SCCH control channels (M) is set to four, and “2 bits of information that are otherwise carried on the HS-SCCH may be conveyed in this manner so that the payload carried by the HS-SCCH is reduced.” *Id.* at 3 (citing Ex. 1005, 3:8–11). “[I]n this example,” Petitioner contends, “two bits of information are conveyed via the fixed relationship between the selected HS-SCCH channel and the value for those two bits, which reduces, but **does not eliminate** ‘the payload’ of dynamic control information carried on the selected HS-SCCH.” *Id.* (citing Ex. 1010 ¶¶ 3–7; Ex. 1003 ¶¶ 69, 71, 73, 80, 97–98, 118, 161–162).

Patent Owner responds that “while Gollamudi includes embodiments that increase the amount of information conveyed and others that decrease the amount of information, Gollamudi’s embodiment that increases the amount of information lacks details about the information conveyed.” PO Sur-reply 5 (citations omitted) (citing Ex. 1005, 3:8–4:3). With respect to Gollamudi’s teachings in Column 2, lines 24–34 and Column 3, lines 8–11, Patent Owner argues that in neither disclosure “is there an indication of **what** information its base station transmits using its spare bits (*i.e.*, the ‘2

bits of information that are otherwise carried on the HS-SCCH' conveyed instead of channel selection)." *Id.* at 7 (citing Ex. 1005, 3:5–11, 2:24–34; Ex. 2001 ¶¶ 199–200; PO Resp. 43).

Based on the full trial record, we agree that the Choi-Gollamudi combination teaches the use of a "fixed parameter" and "dynamic parameter" as claimed in limitations 1.1 and 1.2. First, we agree with Petitioner that Choi discloses transmitting channelized code information dynamically. Pet. 30; Ex. 1003 ¶¶ 101, 110–111, 81, 83. We also agree that Gollamudi discloses transmitting extra channelized code information using a "fixed" parameter in addition to information already carried by the communication channel, by disclosing that each HS-SCCH control channel is preconfigured to be associated with a specific value for a set of one or more bits. Pet. 25; Ex. 1005, 2:50–63; Ex. 1003 ¶¶ 97–98, 69–72, 79–80. For example, Gollamudi includes the following disclosure:

The idea of the invention is to be able to transmit *extra information* of up to $\log_2 M$ bits to the receiver *in addition to the information that is already carried by the communication channel*, without modifying the communication channels. This is done using the fact that *selection of a particular channel for transmission from among the M available channels conveys $\log_2 M$ bits of information*.

In the case of HS-SCCH transmissions, each user monitors M HS-SCCH transmission from one of those M channels. The transmitter can transmit an *additional $\log_2 M$ bits of information* to the scheduled user *by choosing the HS-SCCH channel* for this user from among the M possibilities depending on the additional message that needs to be conveyed. Ex. 1005, 2:50–63 (emphasis added).

We do not agree with Patent Owner's argument that Gollamudi teaches only the use of a fixed transmission resource and excludes the

possibility of using both fixed and dynamic resources. *See* PO Resp. 33–45; PO Sur-reply 3–11. To the contrary, we agree with Petitioner that this argument ignores Gollamudi’s disclosure that “[t]he transmitter can transmit an **additional** $\log_2 M$ bits of information to the scheduled user by choosing the HS-SCCH channel from among the M possibilities,” which allows “the payload carried by the HS-SCCH [to be] **reduced**.” Ex. 1005, 2:57–63 (emphasis added), 3:5–11 (emphasis added). Similarly, Gollamudi discloses that “[t]he idea of the invention is to be able to transmit extra information of up to $\log_2 M$ bits to the receive in addition to the information that is already carried by the communication channel” by using “selection of a particular channel for transmission from among the M available channels” which “conveys $\log_2 M$ bits of information.” *Id.* at 2:50–56. We agree with Dr. Wells that these disclosures would have indicated to one of ordinary skill that Gollamudi contemplated implementations in which both a fixed parameter (the $\log_2 M$ bits conveyed via channel selection) and a dynamic parameter (the payload carried by the HS-SCCH) were used to convey control information to the receiver/UE. Ex. 1010 ¶¶ 3–6. And, these disclosures certainly suggest that one of ordinary skill would not have understood Gollamudi to be limited to systems using only a fixed parameter, as Patent Owner contends.

Gollamudi’s disclosure of the transmission of fixed and dynamic parameters is also supported by Mr. Lanning’s deposition testimony. At his deposition, Mr. Lanning testified that, in Gollamudi, “[t]he signaling payload, or the payload or the information carried by the HS-SCCH signalling channel, that would be dynamic information.” Ex. 1011, 68:16–20; *see also id.* at 75:10–14 (in Gollamudi “the payload is the dynamic

information”), 82:25–83:5 (agreeing that in Gollamudi, starting at Column 3, line 5, “the second sentence in this paragraph is giving an alternative example in which two bits of dynamic information are reduced and replaced by channel selection”), 86:25–87:3 (“Gollamudi describes some dynamic parameters”). Mr. Lanning further testified that, in Gollamudi, the “ $\log_2 M$ bits of information” conveyed by channel selection is “referring to a static, preconfigured parameter” (*id.* at 78:24–79:11), and that, when Gollamudi refers “to adding to bits to what’s being transmitted” via channel select, “those two bits have to be predetermined, meaning a fixed transmission resource” (*id.* at 88:9–25).

Consequently, we find that the Choi-Gollamudi combination teaches limitations 1.1 and 1.2.

c) [1.3]: “transmitting the address, to the secondary station, using the selected control signalling channel.”

Petitioner argues that the proposed combination of Choi and Gollamudi teaches this element. In the Choi-Gollamudi combination, Petitioner asserts, the bits of channelization code information “not conveyed by channel selection (constituting the dynamic parameter coded into an address) are transmitted on the HS-SCCH,” and “the address, which includes the dynamic parameter, is transmitted to a secondary station in the form of Choi’s UE.” Pet. 35–36 (citing Ex. 1004 ¶¶ 23–26, 35–37; Ex. 1003 ¶¶ 118–119, 87–88; Ex. 1005, 2:4–15).

Patent Owner does not present arguments regarding this limitation. PO Resp. 33–45.

We agree that the Choi-Gollamudi combination discloses transmitting the address, to the secondary station, using the selected control signalling

channel. *See* Ex. 1004 ¶¶ 23–26, 35–37; Ex. 1005, 2:4–15; Ex. 1003 ¶¶ 118–119, 87–88.

d) Summary for Claim 1

Based on the full trial record, Petitioner has proven by a preponderance of the evidence that claim 1 would have been obvious based on Choi and Gollamudi. As discussed below in Section II.F, Patent Owner’s evidence of objective indicia of obviousness is weak at best. We have fully considered this evidence in our obviousness analysis, and find that it does not outweigh Petitioner’s evidence that claim 1 would have been obvious over the combination of Choi and Gollamudi.

5. Independent Claim 27

Petitioner contends that independent claim 27 is unpatentable based on the proposed combination of Choi and Gollamudi, relying on similar arguments as for claim 1. Pet. 1, 51–54. Patent Owner also relies on the same arguments for claim 27 as for claim 1. PO Resp. 44–45. For the reasons discussed above with respect to claim 1, we determine that Petitioner has proven by a preponderance of the evidence that claim 27 is unpatentable over Choi and Gollamudi.

6. Dependent Claims 2–13 and 28–33

Petitioner contends that claims 2–13 and 28–33, which depend from claims 1 or 27, are unpatentable based on the proposed combination of Choi and Gollamudi. Pet. 1, 36–51, 54–55. Patent Owner does not provide any separate argument against these dependent claims. PO Resp. 45.

For claims 2 and 28, Petitioner argues that “[b]oth Choi and Gollamudi disclose that the at least one transmission resource is a code, specifically an OVSF / channelization code.” Pet. 36, 54. We agree with

this argument and find it to be supported by the disclosures of Choi and Gollamudi and Dr. Wells's testimony. *See* Ex. 1004 ¶¶ 7, 25–26, 35–37; Ex. 1005, 2:4–9; Ex. 1003 ¶¶ 120, 164.

For claim 3 and 29, Petitioner argues that Choi's Node B is the claimed primary station and Choi's UE is the claimed secondary station. Pet. 36–37. Petitioner also asserts that Choi "describes that the OVSF/channelization codes identified by the code_info," described with respect to claim 1 above, "are for transmitting data from the Node [B] to the UE." *Id.* at 37. Additionally, according to Petitioner, "Choi expressly describes 'a process of actually **receiving data by a UE based on the control information** transmitted over the HS-SCCH,' the control information including the code_info identifying the assigned OVSF codes." *Id.* We agree with these assertions and find them to be supported by the disclosures of Choi and Dr. Wells's testimony. *See* Ex. 1004 ¶¶ 5–6, 14, 23–26, 37–39, Fig. 1; Ex. 1003 ¶¶ 121–122, 166.

For claim 4 and 30, Petitioner argues that "Choi discloses that the Node B will identify 'a **UE expected to transmit data** at the next [transmission time interval]' and transmit control information to the UE to facilitate such transmission," and that "[s]uch control information includes 'channelization code information.'" Pet. 37–38. "Indeed," Petitioner asserts, "Choi discloses that the HSDPA communication system includes dedicated physical channels (DPCHs) for both downlink (Node B to UE) and uplink (UE to Node B) data transmissions." *Id.* at 38. Moreover, Petitioner contends, "[t]o the extent Choi primarily describes transmission of the code_info via the HS-SCCH in the context of downlink messages," it would have been obvious to a person of ordinary skill "to utilize the

transmission resources (OVSF / channelization codes) of the Choi-Gollamudi combination to assign both downlink *and uplink* (i.e., UE to Node B) communication slots for the UE in communication with each Node B.” *Id.* According to Petitioner, such a configuration “would have eliminated the need for the communication system to use two different schemes for assigning the downlink and uplink resources,” leading to “an efficient system.” *Id.*

We agree with Petitioner’s assertions that Choi teaches an HDSPA communication system with dedicated physical channels (DPCHs) for both downlink (Node B to UE) and uplink (UE to Node B) data transmissions, which are supported by the disclosures of Choi and Dr. Wells’s testimony. *See* Ex. 1004 ¶¶ 5–6, 14, 20–23, 25–26, 54, Fig. 1; Ex. 1003 ¶¶ 123–125. We also agree that it would have been obvious to one of ordinary skill to use the OVSF channelization codes to assign both downlink and uplink communication slots for the UEs communicating with each Node B. *See* Ex. 1003 ¶ 125.

For claims 5, 10, and 31, Petitioner argues that, in the Choi-Gollamudi combination, one of ordinary skill “would have recognized that it would have been obvious to replace any number of code_info bits with HS-SCCH selection, depending on the specific requirements of the system being designed.” Pet. 39. Thus, Petitioner asserts, “it would have been an obvious and conventional choice to convey the first three bits of the code_info (representing the number of OVSF codes assigned to the UE) via HS-SCCH selection while the starting point/offset would have been conveyed dynamically via the payload.” *Id.* at 39–40; *see id.* at 44–45, 55. As another example, Petitioner contends, “it would have been obvious to configure the

system such that the last two bits of Choi's 7 bits of code_info are conveyed via channel selection in a system using 4 HS-SCCHs." *Id.* at 40–41; *see id.* at 45–46, 55. We agree with this argument and find it to be supported by the disclosures of Choi and Gollamudi and Dr. Wells's testimony. *See* Ex. 1004 ¶ 37; Ex. 1005, 2:19–3:11; Ex. 1006 ¶ 23, Fig. 2; Ex. 1007, 61; Ex. 1008, 24; Ex. 1003 ¶¶ 70, 79–81, 83–86, 88, 101–103, 106–107, 110–114, 126–132, 141–143.

For claim 6, Petitioner argues that, in the second example discussed with respect to claim 5 above, "the remaining parameters conveyed dynamically on the HS-SCCH include the additional offset (bits 4–5) and the number of assigned OVSF / channelization codes (bits 1–3)." Pet. 41. We agree with this argument and find it to be supported by the disclosures of Choi and Gollamudi and Dr. Wells's testimony. *See* Ex. 1003 ¶ 133; Ex. 1004 ¶ 37; Ex. 1005, 2:19–3:11.

For claim 7, Petitioner argues that, in the first example discussed for claim 5 (in which each UE monitors eight HS-SCCHs and the first three bits of code_info representing the number of OVSF codes assigned to the UE would have been conveyed via HS-SCCH selection), "the value of the number of OVSF codes allocated to the UE is the fixed parameter pre-associated with the selected HS-SCCH." Pet. 42. We agree with this argument and find it to be supported by the disclosures of Choi and Gollamudi and Dr. Wells's testimony. *See* Ex. 1003 ¶¶ 134–136, 102–103; Ex. 1005, 2:4–9, 2:19–3:11.

For claims 8 and 9, Petitioner relies on the example where four HS-SCCH channels are monitored by any given UE, the first two bits of the first three bits indicating the number of OVSF codes are conveyed by channel

selection, and the last five bits are conveyed dynamically via the HS-SCCH. Pet. 42–43. Petitioner argues that, in this example, “the HS-SCCH channel selected indicates that at least three OVSF codes are assigned to the UE (bits 1–2) while the remaining dynamic parameters include an indication of *an additional number of OVSF codes* (in this case, bit 3 indicating one additional OVSF code, for a total of four OVSF codes) assigned to the UE.” *Id.* at 43. “That is,” Petitioner contends, “the fixed parameter pre-associated with each HS-SCCH in this example is an additional number of assigned codes, while the dynamic parameters include *an additional number of assigned codes* and the starting point/offset within the code tree for the first assigned code.” Petitioner also argues that “[t]he additional number of assigned OVSF codes (one)” is “a positive number.” *Id.* at 44. We agree with this argument and find it to be supported by the disclosures of Choi and Gollamudi and Dr. Wells’s testimony. *See* Ex. 1003 ¶¶ 137–139, 104–105; Ex. 1004 ¶ 63.

For claims 11 and 32, Petitioner argues that, in the second example discussed with respect to claims 5 and 10, “the starting point is indicated based on a remaining dynamic parameter indicating a portion of the value of the starting point (bits 4–5 conveyed dynamically)” while “the rest of the value of the starting point (bits 6–7) are conveyed based on the preconfigured association between the fixed value for bits 6–7 and the selected HS-SCCH control channel.” Pet. 35, 55. We agree with this argument and find it to be supported by the disclosures of Choi and Gollamudi and Dr. Wells’s testimony. *See* Ex. 1003 ¶¶ 144–145; 1004 ¶ 37; Ex. 1005, 2:19–3:11.

For claim 12, Petitioner again references the second example discussed with respect to claims 5 and 10 and argues that, in this example, “a fixed parameter of an initial starting point of three (bit value of two, plus one) is conveyed via pre-association of the selected HS-SCCH with a specific value for the last two bits” while “both the number of assigned codes (bits 1–3) and an additional value for determining the starting point (bits 4–5) is conveyed dynamically as a ‘remaining parameter’ via the information actually transmitted on the selected HS-SCCH.” Pet. 47. Petitioner also contends that one of ordinary skill “would have known, as evidenced by the 3GPP standards on which Choi is based, that the term ‘start point’ used by Choi to refer to the last four bits of code_info was also commonly referred to as an ‘offset,’” and therefore “the additional starting point value of bits 4–5 represent an ‘additional offset.’” *Id.* at 47–48. We agree with this argument and find it to be supported by the disclosures of Choi and Gollamudi and Dr. Wells’s testimony. *See* Ex. 1003 ¶¶ 65, 146–149; Ex. 1004 ¶ 37; Ex. 1005, 2:19–3:11; Ex. 1006 ¶ 23, Fig. 2; Ex. 1007, 61; Ex. 1008, 24.

For claims 13 and 33, Petitioner argues that “Choi discloses that Radio Resource Control (RRC) signaling is used to establish preconfigured settings between the Node B and the UE when establishing a communication session.” Pet. 48, 55. According to Petitioner, “Choi discloses that the RRC Connection Setup message includes information for preconfiguring the UE for communications.” *Id.* at 48–49. Petitioner asserts that “Choi further describes that the ‘MAC-hs controller’ for each Node B includes a configuration controller (CC) 1360 for providing configuration to each UE,” including “HS-SCCH set-related information and an identifier (ID) of a

serving HS-SCCH set,” and the CC 1360 “is also responsible for configuring updated HS-SCCH information that is provided to each UE.” *Id.* at 49.

According to Petitioner, Choi’s UE also “includes a corresponding CC 1660 to configure the UE ‘based on configuration information ***delivered by a radio resource control (RRC) layer***,” and that CC 1660 of each UE “***receiv[es] HS-SCCH set-related information*** and an identifier of a serving HS-SCCH set ***from the RRC layer***’ which is then stored at the UE.” *Id.*

Petitioner contends that one of ordinary skill “would have recognized that it would have been obvious and beneficial to include the information for pre-configuring the association between each monitored HS-SCCH in the HS-SCCH set for a particular UE and the fixed parameter value” in “the configuration information provided to the UE over the RRC layer,” because “this configuration information transmitted via RRC already included information related to configuration of ‘HS-SCCH set-related information’ and the fixed relationship in the Choi-Gollamudi combination described with respect to claim 1 is simply additional HS-SCCH related information.”

Pet. 49–50. In other words, “Choi already describes a mechanism for providing HS-SCCH related control information to the UE, via RRC signaling,” and using “this RRC signaling to convey additional HS-SCCH related control information describing the fixed relationship would have been beneficial” because “the system designers would not have had to devise a new mechanism for providing such pre-configuration information to the UE.” *Id.* at 50. We agree with this argument and find it to be supported by the disclosures of Choi and Dr. Wells’s testimony. *See* Ex. 1003 ¶¶ 150–154; Ex. 1004 ¶¶ 5, 66, 67, 133, 136–140, 174, Fig. 1.

Based on the full trial record, we find that Petitioner has proven by a preponderance of the evidence that claims 2–13 and 28–33 would have been obvious over Choi and Gollamudi. As discussed below in Section II.F, Patent Owner’s evidence of objective indicia of obviousness is weak at best. We have fully considered this evidence in our obviousness analysis, and find that it does not outweigh Petitioner’s evidence that these claims would have been obvious over the combination of Choi and Gollamudi.

E. Ground 2: Obviousness of Dependent Claims 4 and 30 Based on Choi, Gollamudi, and Rudolf

Petitioner contends that dependent claims 4 and 30 would have been obvious over the proposed combination of Choi, Gollamudi, and Rudolf. Pet. 1, 55–59. Patent Owner does not provide any separate argument directed to Ground 2. PO Resp. 47.

1. Overview of Rudolf (Ex. 1006)

Rudolf is directed to “a wireless communication system” for “providing channel assignment information to support uplink and downlink transmissions,” and describes the use of HSPDA in a universal mobile telecommunication system (UMTS). Ex. 1006 ¶¶ 2, 3. Rudolf also describes transmitting seven bits of channelization code information from a base station to a user device over an HS-SCCH, which “contains channelization code mapping and modulation format information.” *Id.* ¶¶ 4–5. The HS-SCCH (also referred to as a “common control channel”) “is utilized for the transmission of radio resources assignment information for both UL and DL transmissions and a specific indication is provided to distinguish whether the radio resource assignment is for either UL or DL transmission.” *Id.* ¶ 22. Rudolf further explains that “each Node-B 104

dynamically allocates radio resources for DL and UL transmissions to and from the WTRU 106 through an HS-DSCH and an EU channel, respectively,” and the “radio resources assignment information for both the HS-DSCH and the EU is transmitted through the common control channel 112.” *Id.* ¶ 21. Rudolf also discloses providing “channelization codes, for both DL and UL transmissions simultaneously” using the HS-SCCH control channel. *Id.* ¶ 22.

2. *Combination of Rudolf with Choi and Gollamudi*

Petitioner argues that, in the Choi-Gollamudi combination, one of ordinary skill “would have known that a conventional mechanism would have been needed to assign UL resources to each UE to facilitate communication with the Node B,” and that “Rudolf provides just such a suggestion to use the channelization codes that are already a part of the Choi-Gollamudi system to achieve this functionality.” Pet. 57. “Furthermore,” Petitioner asserts, “applying Rudolf’s teachings to the Choi-Gollamudi system would have allowed for the same control channel to be used to convey information regarding both uplink and downlink transmissions,” leading to “greater efficiency in the system.” *Id.* Finally, Petitioner contends that “Gollamudi, and Rudolf all disclose UMTS mobile communication systems that employ an HSDPA data transmission scheme that includes conveying channelization codes on a control channel,” and one of ordinary skill “would have recognized that Rudolf’s suggestions would have been readily and beneficially applied to the Choi-Gollamudi combination,” and one of ordinary skill would have “had a reasonable expectation of success” in doing so. *Id.* at 57–58.

Patent Owner does not address Petitioner’s argument that it would have been obvious to combine Rudolf with Choi and Gollamudi. PO Resp. 45–48.

Based on the full trial record, we find that Petitioner has proven a sufficient motivation to combine Rudolf with Choi and Gollamudi, as supported by the references and the testimony of Dr. Wells. Ex. 1003 ¶¶ 175–176; Ex. 1004 ¶ 276. As discussed below in Section II.F, Patent Owner’s evidence of objective indicia of obviousness is weak at best. We have fully considered this evidence in our obviousness analysis, and find that it does not outweigh Petitioner’s evidence that one of ordinary skill would have been motivated to combine Rudolf with Choi and Gollamudi.

3. *Dependent Claims 4 and 30*

Petitioner argues that “Rudolf describes that ‘the *common control channel* 112 is utilized for the *transmission of radio resources assignment information for both UL and DL* transmissions and a specific indication is provided to distinguish whether the radio resource assignment is for either UL or DL transmission.’” Pet. 58. “This radio resources information,” Petitioner asserts, “includes information identifying ‘*channelization codes, for both DL and UL transmissions.*’” *Id.* Petitioner further contends that, as it explained with respect to claim 1, “channelization codes provide the claimed indicated set of at least one transmission resource” and, therefore, “the Choi-Gollamudi-Rudolf combination provides that the indicated set of at least one transmission resource is for transmitting data from the secondary station to the primary station *and* for transmitting data from the primary station to the secondary station.” *Id.* at 58–59.

We agree with Petitioner’s argument and find it to be supported by the disclosures of the references and Dr. Wells’s testimony. *See* Ex. 1003 ¶¶ 173–174, 177–178; Ex. 1006 ¶¶ 21–23. Based on the full trial record, we find that Petitioner has proven by a preponderance of the evidence that claims 4 and 30 would have been obvious over Choi, Gollamudi, and Rudolf. As discussed below in Section II.F, Patent Owner’s evidence of objective indicia of obviousness is weak at best. We have fully considered this evidence in our obviousness analysis, and find that it does not outweigh Petitioner’s evidence that claims 4 and 30 would have been obvious over the combination of Choi, Gollamudi, and Rudolf.

F. Objective Indicia of Nonobviousness

Patent Owner argues that the adoption of its claimed invention into the UMTS standard is objective indicia supporting the nonobviousness of the challenged claims. PO Resp. 48–51; PO Sur-reply 25–27. Petitioner disagrees. Pet. Reply 19–27.

1. The Parties’ Arguments

Patent Owner argues, relying on the Lanning Declaration, that at least claims 1 and 27 are embodied in the UMTS standard TS 25.212, which “describe a UMTS UE and a Node B that communicate, via []HS-SCCHs and RRC signalling, information about transmission resources, including the channelization codes in bits of channelization-code-set information (7 bits: $x_{CCS}, 1, \dots, x_{CCS}, 7$).” PO Resp. 49 (citing Ex. 2001 ¶¶ 212–235; Ex. 1001, claims 1, 27). Patent Owner asserts that, “[a]s with the claims of the ’814 patent, the UMTS standard describes using preconfigured associations (e.g., between the HS-SCCH number and range of codes) as fixed parameters and dynamic parameters,” and that these features “are also reflected in the

proposed solutions submitted to, and the discourse documentation published by, the 3GPP Working Group.” *Id.* (citing Ex. 2001 ¶¶ 220–235).

Patent Owner argues that the adoption of at least claims 1 and 27 as an industry standard “demonstrat[es] industry praise and widespread adoption.” PO Resp. 49–50. According to Patent Owner, it “and other industry competitors participating in the 3GPP Technical Specification Group Radio Access Network (TSG RAN) Working Group of the standards body submitted documents to support 64QAM in UMTS systems,” including “proposals that included fixed parameters or increasing the number of control bits communicated via HS-SCCH.” *Id.* (citing Ex. 2001 ¶¶ 213–219). Patent Owner contends that, “[d]uring the Working Group’s conference of January 15–19, 2007, the Working Group evaluated the various options submitted by the participants,” and “ultimately issued a document, R1-070570, promulgating a solution that adopted [Patent Owner’s] approach to using both a fixed parameter and a dynamic parameter for accessing the CCS and HS-SCCH.” *Id.* (citing Ex. 2001 ¶¶ 221–235). Patent Owner argues that the solution it proposed “was ultimately adopted as part of the UMTS standard” in TS 25.212, and “is embodied in the ’814 patent.” *Id.* (citing Ex. 2001 ¶¶ 212–235). Additionally, Patent Owner argues that, because at least claims 1 and 27 are embodied in the standard, there is a nexus between those claims and the industry praise and widespread adoption of its invention. *Id.* at 49.

Petitioner responds that Patent Owner includes only two sentences in its Patent Owner Response asserting that the TS 25.212 specification embodies the claims, and improperly incorporates by reference 23 paragraphs of Mr. Lanning’s deposition testimony. Pet. Reply 19.

Additionally, Petitioner argues that Mr. Lanning’s testimony “confirms that the TS 25.212 specification (EX2011) does not embody the claims of the ’814 patent,” because he alleges that “the preconfigured bit is *for the type of modulation being used* (16QAM or 64QAM) and the value of the preconfigured bit is determined by the number of the HS-SCCH channel being used.” *Id.* at 20 (citing Ex. 1010 ¶¶ 27, 37; Ex. 2001 ¶ 218). Petitioner asserts that, even if this is true, “this alleged preconfigured bit does not embody the claims because identification of ‘the type of modulation being used’ is not a ‘transmission resource from among a plurality of transmission resources’ as recited by the independent claims,” but rather is “an indication of the format in which information is conveyed.” *Id.* at 20–21 (citing Ex. 1011, 18:7–19:15).

Petitioner also argues that the portions of the TS 25.212 specification relied on by Mr. Lanning “are not ‘coextensive with’ the challenged claims because the specific solution in the TS 25.212 specification includes numerous unclaimed features not covered by the claims.” Pet. Reply 21 (citing *Fox Factory Inc. v. SRAM LLC*, 944 F.3d 1366, 1373–74, 1378 (Fed. Cir. 2019)). “As an initial matter,” Petitioner asserts, “the identified version of the TS 25.212 specification describes numerous unclaimed features” and is therefore not “coextensive with” the challenged claims. *Id.* at 22 (citing Ex. 1010 ¶¶ 70–71). Petitioner also contends that Section 4.6.2.3 of the TS 25.212 specification, which Mr. Lanning identifies as embodying the claimed invention, is itself not coextensive with the claims because the majority of that section “discusses a technique for determining whether ‘64QAM is configured for the UE’ and further indicating whether 16QAM or 64QAM is used when 64QAM is configured.” *Id.* (citing Ex. 1010 ¶¶ 72–

75; Ex. 2011, 65–66). “By contrast,” according to Petitioner, “indication of a bit value based on whether the HS-SCCH number is odd or even occupies merely one line of this section,” with most of the section being concerned with “[d]etermining whether 64QAM is configured for the UE and signaling whether 16QAM or 64QAM is used,” which is “a solution absent from the challenged claims.” *Id.* (citing Ex. 1010 ¶¶ 72–73).

Additionally, Petitioner argues that there is no showing of “industry praise” because Patent Owner’s proposal (Ex. 2004) “bears little resemblance to § 4.6.2.3 of TS 25.212,” which “is concerned with identifying if 16QAM or 64 QAM modulation will be used.” Pet. Reply 23 (citing Ex. 1010 ¶¶ 74–75; Ex. 2011, 65–66; Ex. 2004, 1–6). Petitioner also argues that the document outlining the proposed approach agreed on by Philips, Ericsson, Motorola, Nokia, and Qualcomm (R1-070570) “more closely resembles the proposal from Nokia in which the least significant bit signals the ‘[u]sed modulation.’” *Id.* at 23–24 (citing Ex. 2005, 2; Ex. 2008 1) (alteration in original).

Petitioner further asserts that, even if Patent Owner had made a showing that the claimed invention was adopted in the standard, the “[m]ere adoption of a feature into (a single line of) a single standard—which encompasses numerous other features and guidelines—does not demonstrate ‘industry praise.’” Pet. Reply 24. Petitioner argues that otherwise “many thousands of patent encompassing minor facets of such a complex standard would all likewise be entitled to conclusions of ‘industry praise.’” *Id.* Indeed, Petitioner contends, “it is entirely possible that an industry adopted the overall standard *in spite of* an obscure, incremental fact in one line of one page of the standard—not because of it.” *Id.* (citing Ex. 1010 ¶¶ 38–69).

Additionally, Petitioner argues that there is no showing of widespread industry adoption, because there is no evidence that this particular version of Section 4.6.2.3 of the TS 25.212 specification was widely used within the industry. *Id.* at 26–27.

Patent Owner responds that “the number of lines in a technical specification to describe a feature is irrelevant” to the issue of whether the claims are embodied in the TS 25.212 standard. PO Sur-reply 25. Patent Owner also argues that Dr. Wells acknowledges that Section 4.6.2.3 of the standard is a mechanism “for assigning the channelization code set depending on what modulation is configured for the UE,” and “disclose[s] determining a bit value based on whether the HS-SCCH number is odd or even.” *Id.* at 26 (emphasis omitted) (alteration in original) (citing Ex. 1010 ¶¶ 72–73; Ex. 2016, 75:2–77:1). Patent Owner acknowledges that “[t]he joint submission, R1-070570 (EX2008), may include some charts that ‘resemble’ Nokia’s submission, R1-070179 (EX2005), but the joint submission includes the use of Philips’[s] described feature of having fixed and dynamic values in combination with the fixed value specified by the HS_SCCH used, as in the ’814 patent.” *Id.* at 26–27 (citing Ex. 2001 ¶¶ 230–231). Patent Owner further argues that its showing of “industry praise” is sufficient, because “[i]ndustry praise arises here from Philips’ sophisticated peer group and experts selecting the Philips[] solution for incorporation into the standard.” *Id.* at 27.

2. Analysis

Based on the full trial record, we find that Patent Owner’s objective indicia of nonobviousness is weak at best. First, we turn to industry praise of the claimed invention. “Evidence that the industry praised a claimed

invention or a product which embodies the patent claims weighs against an assertion that the same claim would have been obvious,” because “[i]ndustry participants, especially competitors, are not likely to praise an obvious advance over the known art.” *WBIP, LLC v. Kohler Co.*, 829 F.3d 1317, 1334 (Fed. Cir. 2016). Here, Patent Owner has not introduced evidence that competitors or other industry participants have praised, or made positive statements about, the claimed invention. At most, Patent Owner alleges that aspects of claims 1 and 27 were adopted in the TS 25.212 standard, and the standard is covered by the claims.⁵

Indeed, the document Patent Owner points to as adopting the claimed invention (R1-070570) does not praise the aspects of the claimed invention allegedly contributed by Patent Owner, but rather merely describes its approach as “a compromise solution for HS-SCCH part 1 structure supporting MIMO with and without 64QAM.” Ex. 2008, 1. In addition, as Dr. Wells points out, R1-070579 includes significant portions from Nokia’s proposal in which the least significant bit signals the modulation used. *Compare* Ex. 2005, 2 *with* Ex. 2008, 1; Ex. 1010 ¶ 75. Patent Owner’s showing of widespread industry adoption of the claimed invention is similarly weak. PO Resp. 49–51. Patent Owner does not point to the adoption of its claimed invention in any products in the industry, or otherwise show that it has been used in the industry. Again, Patent Owner relies only on the alleged inclusion of its claimed invention in the TS 25.212 standard. *Id.*

⁵ For purposes of this Decision, we do not need to reach the issue of whether the challenged claims cover the TS 25.212 standard, and decline to do so.

Next, we turn to the issue of nexus. For objective indicia of nonobviousness to be accorded substantial weight, its proponent must establish a nexus between the evidence and the merits of the claimed invention. *ClassCo, Inc., v. Apple, Inc.*, 838 F.3d 1214, 1220 (Fed. Cir. 2016). A patentee is entitled to a presumption of nexus “when the patentee shows that the asserted objective evidence is tied to a specific product and that product ‘embodies the claimed features, and is coextensive with them.’” *Fox Factory*, 944 F.3d at 1373 (quoting *Polaris Indus., Inc. v. Arctic Cat, Inc.*, 882 F.3d 1056, 1072 (Fed. Cir. 2018)).

Based on the evidence of record, we do not find that Patent Owner is entitled to a presumption of nexus. Even if we were to find that claims 1 and 27 cover the TS.232 standard, we do not find that the claims are “coextensive with” the TS.232 standard. As Dr. Wells testifies, the TS.232 standard “describes dozens, and possibly hundreds, [of] features and functions other than the specific feature described in § 4.6.2.3,” upon which Patent Owner relies. Ex. 1010 ¶ 71. Even if we consider only Section 4.6.2.3 of the standard, we still do not find coextensiveness because, as Dr. Wells further testifies, “the predominant concern of § 4.6.2.3 is a mechanism for making a determination as to whether a particular UE is configured for 16 QAM or 64 QAM modulation and for assigning the channelization code set depending on what modulation is configured for the UE,” which is not a feature recited in the challenged claims. *Id.* ¶ 72; Ex. 2011, 65–66. Indeed, Section 4.6.2.3 includes only a very brief discussion of determining of a bit value based on whether the HS-SCCH number is odd or even. Ex. 2011, 65–66; Ex. 1010 ¶ 73. We find Dr. Wells’s testimony on these points to be credible.

The lack of a presumption, however, does not by itself resolve the issue of nexus. “A finding that a presumption of nexus is inappropriate does not end the inquiry into secondary considerations”; rather, “the patent owner is still afforded an opportunity to prove nexus by showing that the evidence of secondary considerations is the ‘direct result of the unique characteristics of the claimed invention.’” *Fox Factory*, 944 F.3d at 1373–74 (quoting *In re Huang*, 100 F.3d 125, 140 (Fed. Cir. 1996)); *see also Lectrosonics, Inc. v. Zaxcom, Inc.*, IPR2018-01129, Paper 33 at 33 (PTAB Jan. 24, 2020) (precedential) (explaining that the Board uses a two-step analysis in evaluating nexus between the claimed invention and objective evidence). Ultimately, “[t]he patentee bears the burden of showing that a nexus exists.” *WMS Gaming, Inc. v. Int’l Game Tech.*, 184 F.3d 1339, 1359 (Fed. Cir. 1999).

Here, Patent Owner has not shown that any “praise” or “industry adoption” of its invention implied by the alleged inclusion of its claimed invention in the TS 25.232 standard is due to the unique characteristics of the claimed invention. As noted above, R1-070570 describes its approach as “a compromise solution,” without identifying or calling out particular characteristics of the invention recited in claims 1 and 27. Ex. 2008, 1. Nor does R1-070570 indicate that there were unique characteristics of Patent Owner’s contribution that led to its adoption. *Id.* As Dr. Wells testifies, “often particular proposals” for a standard “are adopted because the proposed features described in a submission would have been recognized as common, intuitive or predictable to those who will be practicing the standard.” Ex. 1003 ¶ 67. We agree with this testimony and find it to be credible. Therefore, the only indication of a nexus between the claimed

invention and the standard is the fact that it was allegedly adopted. As a result, we find that any nexus between the alleged inclusion of aspects of claims 1 and 27 in the TS 25.232 standard and the invention of the challenged claims is weak at best. Nonetheless, as discussed above, we have fully considered this evidence in reaching the conclusions of obviousness set forth in this Decision.

III. CONCLUSION⁶

For the reasons discussed above, Petitioner has proven, by a preponderance of the evidence, that the challenged claims are unpatentable, as summarized in the following table:

Claim(s)	35 U.S.C. §	Reference(s)/Basis	Claims Shown Unpatentable	Claims Not Shown Unpatentable
1–13, 27–33	103(a)	Choi, Gollamudi	1–13, 27–33	
4, 30	103(a)	Choi, Gollamudi, Rudolf	4, 30	
Overall Outcome			1–13, 27–33	

⁶ Should Patent Owner wish to pursue amendment of the challenged claims in a reissue or reexamination proceeding subsequent to the issuance of this decision, we draw Patent Owner’s attention to the April 2019 *Notice Regarding Options for Amendments by Patent Owner Through Reissue or Reexamination During a Pending AIA Trial Proceeding*. See 84 Fed. Reg. 16,654 (Apr. 22, 2019). If Patent Owner chooses to file a reissue application or a request for reexamination of the challenged patent, we remind Patent Owner of its continuing obligation to notify the Board of any such related matters in updated mandatory notices. See 37 C.F.R. § 42.8(a)(3), (b)(2).

IV. ORDER

In consideration of the foregoing, it is hereby:

ORDERED that claims 1–13 and 27–33 of the '814 patent have been shown to be unpatentable; and

FURTHER ORDERED that, because this is a Final Written Decision, parties to the proceeding seeking judicial review of the Decision must comply with the notice and service requirements of 37 C.F.R. § 90.2.

PETITIONER:

Michael Hawkins
Patrick Bisenius
Kim Leung
Jun Li
Nicholas Stephens
Jennifer Huang
Baile Xie
Terry Stalford
Rishi Gupta
FISH & RICHARDSON P.C.
hawkins@fr.com
bisenius@fr.com
leung@fr.com
li@fr.com
nstephens@fr.com
jjh@fr.com
xie@fr.com
stalford@fr.com
rupta@fr.com

PATENT OWNER:

George Beck
Eley Thompson
Justin Sobaje
Matthew Horton
FOLEY & LARDNER LLP
gbeck@foley.com
ethompson@foley.com
jsobaje@foley.com
mhorton@foley.com